

Claims

1. A reader/writer antenna which is used for an RFID system for non-contacting data communication wherein a plain soft magnetic member is disposed on a surface for
5 disposing an object of the antenna coil which is formed by at least one turn.
2. A reader/writer antenna which is used for an RFID system for non-contacting data communication wherein a plain soft magnetic member is disposed on a surface for
disposing an object of the antenna coil which is formed by winding the plain soft
10 magnetic member in a spiral manner.
3. A reader/writer antenna according to Claim 1 or 2 wherein: the soft magnetic member is formed so as to overlap a part of the antenna coil in an orthogonal view toward an antenna surface of the antenna coil; and a magnetic flux which is generated by
15 the antenna coil is formed asymmetrically with reference to a center axis of the antenna coil.
4. A reader/writer antenna which is used for an RFID system for non-contacting data communication wherein the antenna coil is formed such that a top surface and a
20 back surface of the plain plate is wound around a magnetic core which is formed by a soft magnetic member.
5. A reader/writer antenna which is used for an RFID system for non-contacting data communication wherein the antenna coil is formed such that a circumferential
25 surface of a column is wound around a columnar magnetic core which is formed by a soft

magnetic member.

6. A reader/writer antenna according to Claim 4 or 5 wherein a soft magnetic plain plate is disposed on a surface for disposing an object for the antenna coil.

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7. A reader/writer antenna according to any one of Claims 1 to 6 wherein a thickness of a soft magnetic member or a thickness of a plain plate magnetic core is set to be approximately 10 mm or thinner.

10 8. A reader/writer antenna according to Claim 1 wherein a thickness T for a soft magnetic member or magnetic core for the plain plate satisfies a relationship $S/L > t > S/(L/\mu)$ under condition that S indicates an area for the antenna coil, L indicates a circumferential length of the antenna coil, and μ indicates a magnetic transmittance ratio of the soft magnetic member.

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9. A reader/writer antenna according to Claim 1 wherein the soft magnetic member is a compound of either a metal powder, a flake or a ferrite powder which are formed by flattening a metal powder.

20 10. A reader/writer antenna according to Claim 9 wherein the metal powder is either one of a carbonyl iron powder, a reduced iron powder, an atomized powder, or an amorphous powder.

11. A reader/writer antenna according to Claim 9 wherein the metal powder or the
25 flake is a flake which is made by flattening a water-atomized iron base alloy or an iron

base alloy power mechanically.

12. A reader/writer antenna according to Claim 11 wherein the iron base alloy contains 6 w% to 15 w% of silicon.

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13. A reader/writer antenna according to Claim 11 wherein the iron base alloy contains at least approximately 1 w% of aluminum or lower, approximately 3 w% of nickel or copper lower, approximately 5 w% of chromium or lower, approximately 10 w% of cobalt or lower in addition to approximately 6 w% to 15 w% of silicon.

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14. A reader/writer antenna according to Claim 9 wherein the compound is an injection molded member, a compressed molded member, a rolled stripped member, or a member to which a painting member is applied.

15 15. The soft magnetic member is either one of an amorphous alloy, a permalloy, a magnetic steel, a silicon steel, a sendust alloy, a Fe-AL alloy, or a soft magnetic ferrite.

16. A reader/writer antenna according to Claim 1 wherein the soft magnetic member is an amorphous film or a layered member of the amorphous film.

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17. A reader/writer antenna according to Claim 1 wherein a non-magnetic conductive member of which initial resistance is approximately $10 \times 10^{-8} \Omega\text{m}$ or lower or a conductive member of which initial resistance is approximately $3 \times 10^{-8} \Omega\text{m}$ is disposed between the soft magnetic member and the object.

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18. A reader/writer antenna according to Claim 1 wherein a non-magnetic conductive member which has a $0.015\ \Omega$ resistance which is more preferably $0.005\ \Omega$ or lower with 1 cm length, 1 cm width is disposed between the soft magnetic member and the object.

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19. A reader/writer antenna according to Claim 1 wherein the object is a metal member or a member which contains a metal member.

20. A reader/writer wherein the reader/writer antenna according to any one of
10 Claims 1 to 19 is disposed so as to contact a casing which is formed by a non-magnetic member which has an initial resistance of approximately $10 \times 10\ \Omega\text{m}$ or lower.

21. A reader/writer antenna according to Claim 2 wherein the casing is made of a conductive member which has $0.015\ \Omega$, more preferably $0.005\ \Omega$ or lower resistance.